

TECHNICAL REVIEW DOCUMENT
for
MODIFICATION to OPERATING PERMIT 95OPLR064

Anheuser-Busch, Inc.

Larimer County
Source ID 0690060

Prepared by Blue Parish
May 2008, Revised March 2009

I. Purpose:

This document will establish the basis for decisions made regarding the requested modifications to the operating permit for the Fort Collins Brewery. This document provides information describing the type of modification and the changes made to the permit as requested by the source and the changes made due to the Division's analysis. This document is designed for reference during review of the proposed permit by EPA and for future reference by the Division to aid in any additional permit modifications at this facility. The conclusions made in this report are based on the information provided in the original request for modification submitted to the Division on December 27, 2007 and supplemental information submitted to the Division on May 22, 2008 and February 10, 2009. This narrative is intended only as an adjunct for the reviewer and has no legal standing.

Any revisions made to the underlying construction permits associated with this facility made in conjunction with the processing of this operating permit application have been reviewed in accordance with the requirements of Regulation No. 3, Part B, Construction Permits, and have been found to meet all applicable substantive and procedural requirements. This operating permit incorporates and shall be considered to be a combined construction/operating permit for any such revision, and the permittee shall be allowed to operate under the revised conditions upon issuance of this operating permit without applying for a revision to this permit or for an additional or revised Construction Permit.

II. Description of Permit Modification Request/Modification Type

The revised operating permit for the Fort Collins Brewery was issued on January 1, 2007. Anheuser-Busch submitted a request on December 27, 2007 to modify the operating permit to allow for production of 795,000 gallons per year of 198.7-proof ethanol from waste beer and Schoene sludge via the alcohol distillation unit (Area 14). Currently, the facility produces 795,000 gallons per year of 190-proof ethanol in Area 14. The proposed process modifications include the following: addition of a

molecular sieve, regenerative surge drum and vacuum, a denaturant blending pump, and a vapor recovery system. Additionally, an existing 3,000 gallon alcohol day tank will be converted to a denaturant tank.

The molecular sieve will be installed downstream of the distillation process, which will allow for more water removal resulting in the higher proof ethanol. The molecular sieve can be regenerated on a periodic basis under vacuum in order to remove the captured water from the sieve. The ethanol exiting the sieve will then be sent to the existing alcohol tanks, and will eventually be loaded out via the existing truck load-out system. Currently, the ethanol is not denatured prior to or during loadout. In the new configuration, the denaturant (natural gasoline) will be slip-streamed into the ethanol line which is simultaneously loaded to the tanker by means of bottom loading. The modification will also include the addition of a vapor recovery system that collects vapors from the sieve regeneration process, the denaturant receiving and from the denatured product loadout process.

Emissions

VOC emissions will result from the new molecular sieve regeneration process. There will be a decrease in VOC emissions from the truck loadout process due to the new vapor recovery system. There are no changes to emissions from the distillation vents or to the distillation tanks in Area 14. Additionally, VOC emissions from the 3,000 gallon denaturant tank (which was previously an alcohol day tank) will result from the storage and receiving of denaturant.

VOC emissions from the modification are:

Unit	Uncontrolled VOC Emissions tpy)	Controlled VOC Emissions (tpy)
Sieve Regeneration	0.32	0.032
Truck load-out	0.16	0.016
Denaturant Receiving	0.003	0.003
Denaturant Storage	0.306	0.306
TOTAL	0.79	0.36

See Attachment A for details on emission factors and calculations

Hazardous Air Pollutants and/or Non-Criteria Reportable Pollutants are not included in the modification application.

Emissions from the modification are less than the PSD significance threshold for VOC (40 tons per year).

Colorado Regulation No. 3, Part C, Section X.A identifies those modifications that can be processed under the minor permit modification procedures. Specifically, minor permit modifications “are not otherwise required by the Division to be processed as a significant modification” (Colorado Regulation No. 3, Part C, Section x.A.6). The Division requires that “any change that causes a significant increase in

emissions” be processed as a significant modification (Colorado Regulation No. 3, Part C, Section I.B.36.h.(i)). Since requested emissions are below PSD significance levels, the Division agrees that this modification qualifies as a minor modification.

III. Modeling – No modeling of emissions required for a VOC only source.

IV. Discussion of Modifications Made

Source Requested Modifications

The source requested that approval be given to modify the alcohol distillation unit as follows:

- Install molecular sieve and associated regenerative surge drum and vacuum. VOC emissions are associated with sieve regeneration.
- Convert an existing 3,000 gallon underground alcohol storage tank to a denaturant tank (natural gasoline). VOC emissions result from denaturant receiving and storage (working and breathing losses).
- Installation of a denaturant blending pump and modification of the existing truck loadout system to slipstream denaturant into the alcohol stream during loadout. VOC emissions associated with the truck loadout will be updated to reflect control provided by the new vapor recovery system.
- Installation of a vapor recovery system to collect vapors from sieve regeneration, denaturant receiving and denatured ethanol loadout.
- The source requested a change in the Responsible Official in a letter received by the Division on February 10, 2009.

The following modifications have been made to the permit:

- Section I, Condition 4.1: AIRS Point 019 (Facility ID P141) has been modified in the Summary of Emission Units table to note the presence of the molecular sieve. The Division also updated the description to include the denaturant tank, and to describe the vapor recovery unit and denaturant balanced submerged filling as control devices.
- Section II, Condition 8 – the title of the section has been changed to note the presence of the molecular sieve. The Division also updated the description to include the denaturant tank.
- Section II, Condition 8: Table 8 has been modified: Sieve Regeneration, Denaturant Receiving and Denaturant Storage were added to the VOC emissions list.
- Appendix A: the modification application requested that the molecular sieve and the denaturant storage tank be listed in the Insignificant Activities List. The Division did not list the Denaturant Tank as an insignificant activity because it is subject to specific requirements from Colorado Regulation No. 7 (see applicable requirements section, below). However, Alcohol Day Storage Tank #3 was removed from Appendix A because it was converted to be the denaturant tank.

- Appendices B, C and H: updated the description for point P141 to include the molecular sieve. The Division also updated the description to include the denaturant tank.

1. Applicable Requirements

NSPS

Ethanol is not produced in the Alcohol Distillation Unit; it is distilled from the waste beer and Schoene sludge produced in other areas of the facility.

Therefore, the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry (40 CFR Part 60 Subparts VV and/or VVa) are not applicable to the Alcohol Distillation Unit.

Reg 7 Requirements for the Denaturant Tank

This facility is located in an area that has been classified as non-attainment for ozone on November 20, 2007. Colorado Regulation No. 7 includes requirements for the storage and transfer of petroleum liquid (Section VI) that apply to the denaturant (natural gasoline) tank. The tank is equipped with a submerged fill pipe and a vapor balance system that employs a hose that returns gasoline vapors displaced from the tank to the tank truck cargo compartments being emptied during Denaturant Receiving. Therefore, the vapor control system for Denaturant Receiving consists of the delivery tanker truck and the piping associated with the denaturant tank.

Reg 7 requirements applicable to the denaturant tank are (all are State-only enforceable as per Reg 7 Section I.A.1.b):

- The owner or operator of storage tanks at a gasoline dispensing facility (service station) or other facility not addressed in Subsections VI.C.2 or VI.C.3, which receives and stores petroleum liquid, shall not allow the transfer of petroleum liquid from any delivery vessel into any tank unless the tank is equipped with a submerged fill pipe and the vapors displaced from the storage tank during filling are processed by a vapor control system. (Regulation No. 7, Section VI.B.3.b). Note the tank is greater than 550 gallons and was installed after November 7, 1973 (Section VI.B.3.(i))
- Tanks equipped with a submerged fill pipe shall meet the specifications of Regulation 7 Appendix B (Regulation No. 7 Section VI.B.3.c)
- The vapor control system shall include a vapor-tight line from the storage tank to delivery vessel (i.e. an approved control system) (Regulation No. 7, Section VI.B.3.d.(i))
- Regulation 7 Section V.B does not apply (denaturant tank is not a bulk plant, terminal or gasoline dispensing facility)
- Regulation 7 Section VI.D does not apply (denaturant tank is not a bulk plant, terminal or gasoline dispensing facility)
- Regulation 7 Section VI.B.2 does not apply (tank is less than 40,000 gallons), and Section VI.C does not apply (facility is not a bulk plant or

terminal).

- The general requirements for maintenance and operation of storage tanks (Reg 7, Section III.A) are already included in the general conditions (Section V) of the permit and are therefore not specifically included in Section II.

Note that as previously discussed, the vapor control system for Denaturant Receiving is essentially the tanker truck (vapor balance system). Therefore the following requirements in Reg 7, Section VI.B.3 will not be included in the operating permit as they apply to the tanker truck/vapor control system:

- Approved vapor balance system system (Reg 7, Section VI.B.3.b(iii))
- Vapor balance system specifications (Reg 7, Section VI.B.3.f)
- Vapor balance system and vapor control system shall meet the requirements of Section XV (Reg 7, Section VI.B.3.g)
- Control device testing and recordkeeping requirements (Reg 7, Section VI.B.3.h & i)

In addition, the requirements in Reg 7, Section XV, "Control of VOC Leaks from Vapor Collection Systems and Vapor Control Systems Located at Gasoline Terminals, Gasoline Bulk Plants and Gasoline Dispensing Facilities" will not be included in the permit as the requirements apply to the operator of a vapor collection or vapor control system, which is the tanker truck.

Applicable Reg 7 requirements for the denaturant tank have been added to the permit as Conditions 8.4, 8.5 and 8.6.

RACT

Reasonably Available Control Technology (RACT) requirements apply to new or modified Minor Sources (including new or modified minor emissions units at major stationary sources) of volatile organic compounds, carbon monoxide, nitrogen oxides, sulfur dioxide, and PM10 in nonattainment and attainment/maintenance areas (Regulation No. 3, Section III.D.2). Minor sources in designated nonattainment or attainment/maintenance areas that are otherwise not exempt pursuant to Section II.D. of this Part, shall apply Reasonably Available Control Technology for the pollutants for which the area is nonattainment or attainment/maintenance (Regulation No. 3, Section III.D.2.a).

Uncontrolled emissions for new and modified emission points (Sieve Regeneration, Denaturant Receiving, Denaturant Storage and Truck Loadout) are less than 1 ton per year VOC each. They are therefore exempt pursuant to Section II.D of Reg 3, Part B., and RACT is therefore not required. RACT applicability for the Distillation Condenser Vents and the Distillation Tanks are not being addressed by this action as they are not being modified by this project.

MACT

According to the November 2003 TRD, the facility is not a major source of HAP

emissions.

2. Emission Factors

The emission factor for sieve regeneration is based on manufacturer's data, as requested in the application. The emission factor for denaturant receiving is based on AP42 Section 5.2-7 for gasoline loading for balanced, submerged filling, as requested in the application. The emission factor for denaturant storage is based on the TANKS 4.09d program, as requested in the supplement to the application received on May 22, 2008. The truck loadout emission factor was updated based on AP42 Section 5.2, Equation 1 (Emissions from loading petroleum liquid):

$$\text{Loading Loss (lb/1000 gal)} = 12.46 * S * P * M / T$$

Where:

S = 0.5 (submerged loading of a clean cargo tank)

P = 0.406 psia (AP-42 7.1-3 for ethanol at 50 °F)

M = 46.07

T = 510 °R (yearly average temperature for Fort Collins)

The emission factors listed in the application do not include control efficiency for the vapor recovery system that operates on the molecular sieve, truck loadout and denaturant receiving (note that the AP42 emission factor for denaturant receiving includes the inherent control from Stage I vapor recovery associated with the tanker truck as described above). The factors listed in the application have been normalized to pounds of VOC emissions per ton of ethanol produced. The application included minor errors in the normalization for denaturant-related emission factors, and did not include any emissions from the increased loadout volume due to the addition of the denaturant. These errors were corrected in the emission factors listed in Section II, Table 8 of the permit (see Attachment 1 to this document for details on emission calculations).

3. Monitoring Plan

According to the original (March 1999) Technical Review Document (TRD) for the facility, the Operating Permit did not include throughput or emission limits for the alcohol distillation process in order to encourage pollution prevention (when ethanol is recovered in Area 14, emissions are reduced at another area in the plant where it would otherwise be disposed of in a manner resulting in VOC emissions). The original TRD did state that the permittee must track emissions on a rolling twelve month total in order to track overall facility VOC emissions for PSD/NSR applicability purposes. However, Section II Condition 8.2 and the Compliance Monitoring Plan of Appendix H specify that VOC emissions should be calculated for the storage tanks but do not mention the other VOC emission sources listed for Area 14. Condition 8.2 language and the corresponding

Appendix H language has been updated to require VOC emission calculations for all units listed under the VOC Emission row in Table 8 (which also includes the condenser vents, sieve regeneration, denaturant receiving and storage and truck loadout). Appendix H language was also updated to note that the emission factors listed in Table 8 are uncontrolled.

Emission factors for the new denaturant tank are normalized to pounds per ton of ethanol produced, as described in the emission factor section above. In order to ensure that this emission factor remains applicable, Condition 8.1 of Section II was modified to include the requirement to track natural gasoline received. Note that the emission factors are based on a total annual amount of gasoline (19,875 gallons) added to a total annual amount of ethanol produced (795,000 gallons) Because the only equipment in Area 14 with uncontrolled emissions greater than 1 ton per year are the distillation vents (which do not use natural gasoline), a throughput limit on natural gasoline was not included.

Other Modifications

In addition to the requested modifications, the Division has included changes to make the permit more consistent with recently issued permits, included comments made by EPA on other Operating Permits, as well as corrected errors or omissions identified during inspections and/or discrepancies identified during review of this modification. These changes are as follows:

Section I - General Activities and Summary

- Revised Condition 1.1 to reflect ozone nonattainment status
- Revised Condition 1.4 to reflect the correct State-only enforceable status of the General Conditions and added a reference to the Reg 7 requirements for the denaturant tank as State-only enforceable.
- Added a new Condition 1.5 and moved the statement regarding recordkeeping and reporting requirements from Condition 1.4 to Condition 1.5. Added a statement that electronic or hard copy records are acceptable.
- Revised Condition 2.1 to reflect the current ozone nonattainment status of the facility's location.

Section II - Specific Permit Terms

- The note at the beginning of Section II regarding the use of emission factors has been removed (the issue is addressed by the general conditions)
- Updated Condition 16, which referenced a previous modification as the current issuance.

Section III – Permit Shield

- The citation in the permit shield was corrected.

Section IV - General Conditions

- Updated the General Conditions to the newest version (2/20/2007)

Appendices

- Removed a blank page at the beginning of the appendices
- Updated the mailing address for EPA in Appendix D
- Included a list of modifications made in Appendix F

Emission Calculations: Addition of Molecular Sieve and Denaturant Tank to Area 14

Emissions Under Current Configuration at 795,000 gallons per year ethanol production

Emission Unit	Emission Factor	Annual Throughput	Control	Uncontrolled Emissions (lb/yr)	Controlled Emissions (lb/yr)
Distillation Vents	3.3 lb/ton EtOH	2718.9 tons EtOH	NA	8972	8972
Distillation Tanks	0.02 lb/ton EtOH	2718.9 tons EtOH	NA	54	54
Truck Loadout	0.0003 lb/gallon EtOH	795000 gal EtOH	NA	239	239
TOTAL EMISSIONS (TONS/YR)				4.63	4.63

Based on ethanol density of 6.84 lb/gal

Emissions Under Proposed Configuration at 795,000 gallons per year denatured ethanol production

Emission Unit	Emission Factor	Annual Throughput	Control	Uncontrolled Emissions (lb/yr)	Controlled Emissions (lb/yr)	uncontrolled EF - ethanol basis (lb/ton EtOH)
Distillation Vents	3.3 lb/ton EtOH	2718.9 tons EtOH	NA	8972	8972	3.3
Distillation Tanks	0.02 lb/ton EtOH	2718.9 tons EtOH	NA	54	54	0.02
Sieve Regeneration	0.0008 lb/gallon EtOH	795000 gallons EtOH	90%	636	64	0.234
Denaturant Receiving	0.0003 lb/gallon gasoline	19875 gal gasoline	*	6	6	0.0022
Denaturant Storage	0.030842767 lb/gallon gasoline	19875 gal gasoline	NA	613	613	0.225
Truck Loadout - EtOH	0.0003 lb/gallon loaded	795000 gallons EtOH	90%	239	24	0.088
Truck Loadout - gas	0.004317024 lb/gallon loaded	19875 gal gasoline	90%	86	9	0.002
TOTAL EMISSIONS (TONS/YR)				5.3	4.9	

NOTES

Control for denaturant receiving is based on Stage I filling and is included in the AP42 emission factor.

Control device for sieve regeneration and truck loadout is vapor recovery unit; control efficiency provided by manufacturer

Distillation Vents and Tanks emission factors are from current permit and remain unchanged

Emission factor for sieve regeneration is provided by the manufacturer

Emission factor for denaturant receiving is from AP42 Section 5.2-7 for balanced submerged filling for gasoline tanks

Emission factor for denaturant storage is based on EPA TANKS 4.09d program

Emission factor for truck loadout is from AP42 section 5.2, equation 1

$$L = 12.46 \cdot S \cdot P \cdot M / T$$

L = loading loss per 1000 gallons

S = saturation factor (0.5 for submerged loading from Table 5.2-1)

P = 0.406 psia (AP42 table 7.1-3 for ethyl alcohol at 50 °F)

M = 46.07 = molecular weight of ethanol

T = 50 °F (yearly average for Fort Collins) = 510R

To convert emission factor from lb/gallon of ethanol to lb/ton of ethanol, use density = 6.84 lb/gal

To convert emission factor from lb/gallon of gasoline to lb/ton of ethanol, the annual emissions (at 19875 gallons gasoline throughput) are divided by the annual amount of ethanol production (795,000 gallons = 2718.9 tons)

Total truck loadout emission factor = EtOH loadout + gas loadout = 0.09 lb/ton EtOH